main factor in controlling the temperature of the earth is the varying heat from the sun acting through changes of wind and atmospheric pressure has been mainly advanced by the work of Sir Norman and Dr. W. J. S. Lockyer and of Prof. Frank Bigelow; they are now strongly reinforced by Dr. B. Helland-Hansen, the director of the biological station at Bergen, and Dr. Nansen, who remark that these views have hitherto received but little support.

The important memoir by these Norwegian oceanographers is based on a detailed study of variations in the temperatures of the air and surface waters along the steamer route from the English Channel to New York. Their detailed discussion of the results and associated problems is accompanied by a valuable series of temperature charts of the North Atlantic for the months of February and March from 1898 to 1910. The data are often uncertain, and the inconvenience of the centigrade thermometer with its zero at freezing point is illustrated by records of water temperature of −3° C. and −4° C., which have to be rejected. Drs. Helland-Hansen and Nansen, after discussion of the theory of oceanic control, reject it as quite inadequate. Thus the chilling effect of the drift of ice into the North Atlantic they estimate as "vanishingly small" in comparison with the heat transported by the air, or even by ocean currents. They consider that, though not yet fully established, the variations of the air temperature preceded, and were therefore not the result of, those of the water temperature. They hold that the variations of temperature require some much greater and more general cause than oceanic variations.

Faith in the meteorological influence of oceanic circulation was greatly favored by the exaggerated estimates attached to what the authors refer to as "the so-called Gulf Stream." Thus the warmth of the water off the Norwegian coast was attributed to that current even by Pettersson and Meinardus; this conclusion the authors describe as surprising because the evidence of salinity shows that the Norwegian waters are coastal and quite different from those of the mid-Atlantic. This sound criticism of the Swedish and Münster oceanographers renders it the more remarkable that there is no reference, either in the long historical discussion or in the bibliography, to the pioneer work on this subject in the earlier papers by Dr. H. N. Dickson, or to his observations as to the seasonal entrance of the Atlantic water into the North Sea. The authors agree with Schott in terminating the Gulf Stream west of Newfoundland, and calling the current off Western Europe the "Atlantic current," for which Dickson's name of "European current" is more descriptive and definite. The Atlantic is a large mass, and has a whole system of currents, of which the so-called Atlantic current is by no means the largest.

Drs. Helland-Hansen and Nansen, after rejecting the oceanic theory, accept as firmly established the dependence of variations in the earth's temperatures on the solar variations proved by sun spots, the numbers of solar prominences, and terrestrial magnetic disturbances. They point out that the influence of the sun on the weather of any area on the earth depends upon so complex a series of factors that the results at first sight appear inconsistent. The crude expectation that an increase of heat supply from the sun would raise the temperature of the whole earth was early dismissed, for the greater evaporation would lower the temperature on the coast lands by increased clouds, rain, and snow. Blanford pointed out, for example, the see-saw of oceanic and continental conditions; but, though his view has not been fully confirmed, his principle is supported by the proof that regions are oppositely affected by changes in the heat supply from the sun. Bigelow has divided the world into three groups of regions: In the "direct" group the temperature conditions vary directly with the sun; in the "indirect" group the variations agree in time, but are opposite in character; in the third, the "indifferent" group, there is no regular correspondence. Sir Norman and Dr. W. J. S. Lockyer have shown that a region may for years belong to the "direct" group, then suddenly become "indirect," and later return to the "direct" group. Drs. Helland-Hansen and Nansen accept this frequent inversion, and also their explanation of the phenomenon.

The author's instructive study of North Atlantic temperatures therefore strengthens the case for solar variations acting through the atmospheric circulation as the main cause of meteorological changes. To what extent the ocean helps by regulating the air temperature and circulation the authors do not discuss in the present memoir; that and other questions are to be dealt with after further investigations in a series of memoirs to which the present is introductory. The usefulness of the promised memoirs would be increased (should they have as many appendices and supplementary notes as the present) if each were provided with an index.

SERVICES OF A VESSEL-REPORTING STATION OF THE WEATHER BUREAU.

The following account of the grounding of the Dutch S. S. *Arakan* on August 29, 1920, near Point Reyes Light, Calif., has been furnished by Mr. J. C. Smith, in charge of the vessel-reporting station of the Weather Bureau at that place. It is published as an illustration of the services being rendered by the Bureau at vessel-reporting stations. The *Arakan* was subsequently refloated and arrived at San Francisco on September 1. The damage sustained, if any, is not known. The officers of the *Arakan* have for many years cooperated with the Bureau in marine work, and the news of her misfortune was received with regret.

On August 29, 1920, at 2 p. m. the Dutch S. S. *Arakan*, 5,000 gross tons, with cargo of sugar and rubber, bound from Batavia for San Francisco, went aground about 6 miles north of this station, during a dense fog. S. O. S. calls resulted in tugs being dispatched from San Francisco. However, they have not succeeded in pulling the vessel off. The vessel's wireless outfit failed on the 30th, and as a result this office was called upon for considerable information by maritime interests and newspapers of San Francisco. Weather and sea conditions were inquired about frequently; also, topographic conditions in the vicinity of the vessel. An aeroplane was dispatched from San Francisco to the scene of the wreck on the strength of information given by this office. Unless the vessel is pulled off the sand within a short time it may break amidship, resulting in the loss of the vessel as well as the valuable cargo.

This office remained open day and night during the critical stage answering inquiries by long-distance telephone.—*F. G. T.*

FIRST SCIENTIFIC CONFERENCE, PAN-PACIFIC UNION.

Under the auspices of the Pan-Pacific Union a scientific conference for the purpose of outlining a plan of exploring the Pacific Ocean was held at Honolulu, Hawaii, beginning August 2, and ending August 20, 1920. This conference brought together a few more than 100 scientists from the countries bordering on the Pacific Ocean. The United States, Australia, New Zealand, Japan, and the Philippine Islands were well represented.

China, Canada, Samoa, and Tahiti each had one delegate. There were none to represent Mexico, Central or South America.

Dr. Herbert E. Gregory was elected chairman of the conference, and Dr. Arthur L. Dean was elected vice chairman and secretary. Sections were organized as follows: Anthropology, Clark Wissler, leader; biology, Charles Chilton, leader; botany, W. E. Safford, leader; entomology, F. Muir, leader; geography, William Bowie, leader; geology, T. Wayland Vaughan, leader; and seismology and volcanology, Fusakichi Omori, leader.

On week days all the members of the conference met during the forenoons in the throne room of the Capitol Building of Hawaii from 9 a. m. till noon. At these meetings papers of general interest were read and discussed.

During the afternoons the different sections held their meetings in small halls. They generally began at 2 p. m. and were concluded at about 5 p. m. Only topics of especial interest to each particular branch of science were discussed at these meetings. This program was adhered to, except when broken by an excursion to the island of Hawaii for the purpose of visiting the volcano of Kilauea. The trip to the volcano occupied five days and it was of especial interest to volcanologists, as talks on volcanism were given and discussed by them.

Delegates representing no less than 24 branches of science were present at the conference. There were 15 botanists, 14 entomologists, 12 zoologists, 11 geologists, and an equal number of ethnologists. Meteorology was represented by only two delegates, who were assigned to the department of geography under the leadership of William Bowie. The oceanographers were also assigned to this department, and they, together with those interested in geodesy, hydrography, and terrestrial magnetism, took part in the discussion of the papers on meteorology.

When meteorology was brought before the general meeting on August 18—preliminary to the passing of resolutions to be presented by the department of geography—some of the Australian delegates brought out the fact that the meteorological station on Macquarie Island had been of great help in improving the Australian weather forecasts. This station was closed during the war and has not yet been reopened.

On August 20 a large number of resolutions was passed by the members of the conference,[1] and among them were the following on meteorology:

RESOLUTIONS ON METEOROLOGY.

Investigations in meteorology, or the physics of the atmosphere, designed to lead to an accurate, scientific knowledge of atmospheric phenomena are of recognized importance. Very little is known of the behavior of the upper air over the land, and still less over the ocean. The fundamental aspects of these phenomena are exhibited in their simplest manner over the greatest of oceans, the Pacific. Hence it is necessary to make meteorological observations over the Pacific for use in studying the more complex problems over the land.

Moreover, the collection and prompt dissemination of marine meteorological data are of great benefit to humanity in carrying on its commerce, and in weather forecasting, which is now limited by a lack of synchronized, uniform, meteorological data over great ocean areas not within the customary track of vessels.

Observations at the place of origin of typhoons, hurricanes, larger cyclonic, and anticyclonic areas, as well as the development, dissipation, oscillation, and translation of the same, are essential to successful forecasting and the study of ocean meteorology. Moreover, the meteorological survey of these ocean areas has practical value; therefore the Governments of the countries bordering on the Pacific Ocean are urged to carefully consider these matters with a view to increasing the number of meteorological vessels and land stations within the confines of this ocean, and on its borders, especially the establishment of vessel-reporting stations in somewhat fixed positions. In considering these matters it is believed that especial attention should be given to increasing the number of stations in the well-known "centers of action."

The Pan-Pacific Scientific Conference commends the ocean navigation companies and their masters of vessels for the valuable assistance they have rendered the meteorological services of the various nations, and urges them to further cooperate, especially in the matter of transmitting their weather reports by radiograph as well as by mail.

Meteorological station on Macquarie Island.—Since the observations made at the meteorological station on Macquarie Island resulted in improvements in the accuracy of weather forecasting, this conference expresses the hope that observations at that station, interrupted by the war, may be resumed at an early date.

Meteorological station on Mauna Loa.—In view of the fact that Mauna Loa, island of Hawaii, the highest accessible point in the central Pacific, offers exceptional opportunities for the exploration of the upper air, it is recommended that a station of the first order be established on its summit for continuous meteorological observations.

The proceedings of the conference will be published by the Pan-Pacific Union at as early a date as possible. There will be included in the publications a tentative plan of operation, which will endeavor to combine the different projects so as to prevent overlapping. Also rules will be supplied so that future operations can be carried on after a uniform plan, in order that work done by one nation will be comparable with that done by other nations.

The citizens of Honolulu were lavish in their hospitality, and the conference closed according to schedule, with regrets on the part of everyone because of the parting of congenial spirits so soon to take place. No time or place was set for another conference, but invitations were extended by both the Australian and New Zealand delegates to hold the next meeting in their countries; and the Honolulu people were equally as anxious to have the next meeting in the Hawaiian Islands.

No one seems to know what the conference will bring forth, though all hope much good will come from it. The problem is certainly one of merit, and its gigantic proportions are such as to make it of international character. It can be solved only through the heartiest cooperation on the part of all the nations bordering on the Pacific Ocean.—*E. A. Beals.*

[1] See *Science* Sept. 24, 1920, pp. 286-287, for the general resolutions, and later issues for those on specific subjects.